Innisfail steamer, sunk in the river Lee, near Cork (Ireland)," by G. P. White, Assoc. Inst. C.E.

MAY 7.—The President in the chair.

The second part of Mr. Fairbairn's paper which remained unfinished from the last meeting was read. It noticed the remarkable richness and purity of the iron ores of the East, and the superior quality of the Damascus steel produced from iron made apparently in the rudest and most primitive manner; it was remarkable that up to the present time there had been but little change in the manner of manufacturing charcoal-iron even in England. This might be accounted for by the small quantity of wood charcoal used for smelting iron, but it appeared that, with the exception of that which was sent into Staffordshire and South Wales, for mingling with the lean ores of the coal measures, but little of the hæmatite or rich ores of Lancashire, Cumberland, Cornwall, or Devonshire was used, although in richness and in quality of metal they equalled those of foreign countries.

The paper then entered at length upon the experiments on the transverse strength of the Turkish iron, and also of the iron from other rich ores presenting the results in a tabular form mingled with those which had been reported on previous occasions in the Transactions of the Philosophical Society of Manchester, and in the reports of the British Association. These tables were arranged so as to afford the means of comparison of the strength and other qualities of various irons, and also for practical purposes, to furnish a guide for selecting such irons as by proper mixture of the different kinds would enable unerring results to be arrived at by the founder when engaged in producing castings for the engineer, the architect, or for various purposes in the arts or in constructions. Simple rules were also given for finding the breaking weight of beams cast from the fifty-two kinds of iron which had been experimented upon. The importance of the subject of the paper, the novelty of the application of Mr. Clay's system, and the unwearied attention of Mr. Fairbairn, together with Mr. Hodgkinson, in the numerous experiments they had made, were fully appreciated by the meeting, and it was announced that the valuable tables would speedily be published entire in the minutes of proceedings of the Institution.

A specimen of steel made from the Turkish ore, and a knife manufactured from it by Mr. Durham, of Regent-street, were exhibited and were much admired.

A letter was read from Dr. Schafhaeutl, drawing attention to some experiments made by Sir David Brewster on the prismatic colours generated in homogeneous bodies when pressure was applied to them. These experiments were recorded in the Philosophical Tranactions for 1816; they furnished a method of rendering visible and of measuring the mechanical changes which take place during the compression, dilitation, or bending of transparent bodies. He also stated that the tints produced by polarized light were correct measures of the compressing and dilating forces, and by employing transparent gums of different elasticities, the changes which occurred in bodies before they were either broken or crushed could be ascertained, and that, forming models of arches of simple refracting substances, such as gum, copal, &c., giving different degrees of roughness to the touching surfaces of the voussoirs, and exposing the model to polarized light, the results of any degree of friction at the joints would be readily observed.

It was stated that similar experiments had been tried by Mr. Biot, at Paris, almost simultaneously with Dr. Brewster, and that, without doubt, this had materially assisted Dr. Robison in his valuable treatise on the strength of materials.

A description of the iron dock-gates at Montrose harbour, by Mr. James Leslie, M. Inst. C.E., was then read. These gates were described in great detail, giving all the dimensions of the several parts, which were fully shewn by some elaborate drawings.

Their framing is of cast-iron, covered on both sides with wrought-iron plates ¼ inch and $\frac{1}{16}$ inch thick, riveted on so as to be watertight, and to render the gates buoyant and partly to compensate for the weight of metal in them, which is about 87 tons. The gates are 55 feet wide and 22 feet 6 inches deep, and are entirely composed of iron, except their bottom bars and the false mitres, which are of oak. The sluice-valves are of iron, without any brass on their faces, but their backs are covered with zinc plates, and the bolts had zinc nuts screwed over the iron ones, in order to check the oxydation of the iron by the galvanic action of the two metals.

A general account of Montrose Harbour was given, and it appeared that although there had existed some doubt as to the successful formation of a harbour in such bad ground, being entirely sand and gravel, which stands full of water to within a few feet of the surface, the work having been submitted to Mr. Walker, president of the institution, and having his approval, had been satisfactorily executed, and stands well.

A model of the large swinging-jib crane used by the contractors at Granton Pier, Edinburgh, and a drawing of the mode of raising the stand-pipe at the East London Waterworks, by Mr. Wicksteed, were exhibited.

The following candidates were balloted for and elected:—Messrs. H. Clutton, S. Hocking, C. Ower, T. Brunton, and G. Evans, as associates.

The following papers were announced to be read at the meeting of May 14th.

No. 681. "Account of the atmospheric railway," by J. Samuda, Assoc. Inst. C. E.

No. 678. "Description of a coffer-dam used for closing the ends of building-slips of her Majesty's Dockyard, Woolwich," by B. Snow, Assoc. Inst. C. E.

OXFORD ARCHITECTURAL SOCIETY.

MAY 1.—The Rev. the Master of University College in the chair.

The following new members were admitted:—T. A. Bowden, Esq., Magdalene Hall; G. Blomfield, Esq., Exeter College; Mr. Margetts, Church Decorator, St. John's-street.

The following presents were received:—The Journal of the British Archæological Association, No. 1, by the committee of the Association.

Rubbings of brasses from Roydon Church, Essex, by Rev. H. S. Burr, Christ Church.

Drawings from the Churches of Chittlehampton, Devon; and Allington, Newton Tony, and Cholderton, Wilts, by Rev. W. Grey, Magdalene Hall.

Architectural Nomenclature of the Middle Ages, by Robert Willis, M.A., F.R.S., &c., Jacksonian Professor in the University of Cambridge, by the author.

Lithographic Views of Churches near Tamworth, by Rev. J. Hanbury, Thatcham, Berks.

The report of the proceedings of the society during the past term was laid on the table.

The chairman again recommended the British Archæological Association to the notice of the members, and Mr. Parker observed that its object is to have members enrolled in every county or, if possible, in every parish, so that no modern improvements or alterations could be made, or any antiquarian discoveries could possibly take place, without the knowledge of the central committee in London. The secretaries of the Oxford Society are authorized to receive the names of those who are willing to join the association.

Mr. Burr, in presenting his rubbings of brasses, regretted that some delay had occurred which rendered him unable to add a rubbing of a fine brass which he had lately copied from the Cathedral of Seville, but which he trusted would soon arrive.

A paper was read by J. E. Millard, Esq., of Magdalene College, on monuments and gravestones, recommending the revival of flat monumental stones, or of coped stones, ornamented with crosses of various forms, with inscriptions if necessary, or with emblems expressing the profession or employment of the deceased, according to the ancient custom. The average cost of an ornamented coped stone is estimated, by a person well versed in such matters, at four pounds, while that of a common head-stone is usually three guineas, and even a small brass would cost ten pounds. The paper was illustrated by a number of drawings of stone coffin-lids, and flat gravestones, ornamented with a great variety of devices, of which, however, the cross generally formed the leading feature, and of a curious boss in the cloisters of Norwich Cathedral, on which a funeral is represented, with eleven monks surrounding a stone coffin in the act of lowering the lid.

The chairman observed, that the adoption of these flat grave-stones, though very desirable, would be attended with much inconvenience in crowded church-yards, and that their use must necessarily be almost confined to the top of brick graves; but wherever their use is practicable, they are infinitely preferable to the modern tombs with which our church-yards are disfigured. He thought, however, that head-stones, made ornamental according to such designs as those furnished by Mr. Paget and Mr. Armstrong, would often be found more convenient than flat stones.

A member observed, that for the graves of the poor, which Mr. Millard appeared to have chiefly in view, the simple wooden cross at the head, with the name or initials and the date, a custom scarcely yet obsolete, was preferable to any memorial of greater pretension, or of a more lasting material.

ELEMENTARY ESSAY ON MORTAR AND CEMENTS.

BY JAMES WILSON, MON. SEC. R.A.A.D.

(*Continued from p.* 227.)

36. These nodular cement-stones are outwardly something like a bulbous root, that is, composed of concentric hollow spheres or layers; the latter are imperfectly defined, but peel away gradually with the action of the atmosphere, being clayey and slightly slaty in texture. The nucleus of the stone is of a more compact formation, though frequently intersected by fissures filled with glistening calcareous laminæ, dividing it into nearly cubical fragments. The cement is made by subjecting the best of them broken into small pieces and separated by alternate strata of small coal, in a proportion of about eight to one, to a strong red heat for from thirty to forty hours, in a kiln kept in constant operation, after which they are ground to powder in a mill. The cement being liable to lose its adhesive power by exposure to the air, is then immediately packed in casks, air and water tight; when only part of a cask is used, the remainder should be repacked in a smaller one, to keep it in good condition, although it would take many months to render it altogether useless. Good cement, when perfectly burnt, is light in weight and of a light-brown colour; when imperfectly roasted, it is heavy and dark; if overdone, black, with carbonized particles interspersed. Some makers mix the scoria of copper with the burnt stone before grinding, and which, being principally composed of oxide and sulphuret of iron, is a very good addition, if introduced in due moderation.

37. It is supposed that the principal part of the lime in the cement combines with the ferruginous clay during the burning, leaving but a small portion to assume the state of hydrate on being wetted, and to return to the state of carbonate by reabsorption of carbonic acid from the atmosphere; and therefore it seems that it undergoes much less change than common mortar is subject to. Cement is not considered good unless it rise to a high temperature when mixed, although this principle never exists in it to such a degree as would be the case if water were thrown on it immediately after burning, but previous to the stones being ground, cause it to fall down into powder, as in the case of common lime.

38. Roman cement is chiefly valuable for its property of resisting the action of water; it does not stand heat well,—indeed, a moderate degree soon destroys all its tenacity. It is used for all building, whether of masonry or bricklayer's work, subject to be wet or damp, constantly or only occasionally. It is also, on account of its property of setting quickly and being incompressible (unless under a load that would crush the bricks or stones themselves), admirably calculated for carrying up such slender piers or other parts as would be in danger of derangement from the weight of the superimposed work, if constructed with common slowly-binding mortar; as well as for the joints of old work, and a variety of purposes demanding especial care. It may be used either by itself, as in water-cisterns and tanks, casting small ornaments, &c., or with a considerable